

# Effect of Food Lactulose in Vitro on the Erythrocytes Membrane and Activity of Na / K-ATPase under Cadmium Exposure

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Lactulose is a carbohydrate established as a bifidus factor and is widely used in many countries as a treatment, prophylactic and therapeutic feeding component especially for gastrointestinal tract disturbances [1]. Cadmium is one of the most spread toxicant producing disturbances of the gastro-intestinal transport barrier [2]. Mechanism of lactulose effectiveness is explained by prebiotics properties but fully does not understand. We based on data about chitooligosaccharides action on erythrocyte membrane [3]. The aim of research was to estimate lactulose influence on erythrocyte membrane in vitro and protection properties of lactulose in condition of cadmium exposure by atomic force microscopy and Na/K-ATPase activity.

**Methods** For the estimation of lactulose action on the cell membranes the rat erythrocytes were incubated with physiological solution (control group) or food lactulose syrups 5 mg/ml (L1 group - 98% of lactulose from "InAlco", Italy; L2 - 41% of lactulose "Laset" from OOO «Shekhon-laktuloza», Russia; L3 - 38% of lactulose BY 100377914.512-2008, Belarus consecutively). Incubation was performed for 15 min at 37°C. For the modelling of cadmium exposure the rat erythrocytes were incubated for 15 min at 37°C with physiological solution (control) or food lactulose syrup (38% of lactulose, 5 mg/ml) and cadmium chloride (100 µg/l) at last. Atomic force microscope has been used to visualize the morphological change of membrane and surface area and volume of cells before and after incubation. Na/K-ATPase activity was estimated in suspension of rat erythrocytes as previously described [4].

**Results** The incubation of erythrocytes in lactulose solution directly affects the state of erythrocytes in vitro according to specify of lactulose manufacturing technology. There was a "roughness" of the membrane (figure 1) increasing the size of which reduces the activity of Na/K-ATPase. The brief exposure of cadmium leads to shrinkage of erythrocytes with a decrease in surface area and volume. Na/K-ATPase activity in the presence of cadmium chloride was less than in the control group. Pre-incubation with lactulose syrup protect erythrocytes due to stabilization of the morphometric cells characteristics. The data obtained require further molecular studies of the biological effects of lactulose.

## References

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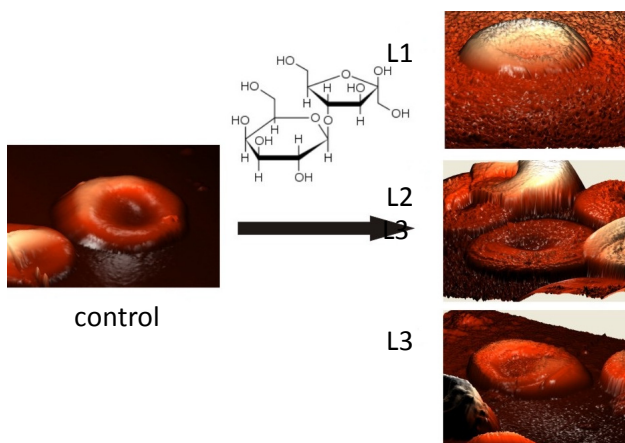


Figure 1. Morphological changes of erythrocyte membrane before (control) and after incubation with lactulose of different manufacturing technology (L1-L3).